

WHAT IS CLAIMED IS:

1. A display apparatus, comprising:

a display panel provided with a pixel section including a light-emitting device driven by a current and with a signal line connected to the pixel section; and

5 a source driver for supplying a drive current to the pixel section via the signal line, wherein the source driver includes:

a register for latching display data having N bits and for outputting the display data;

a timing control unit for outputting a control signal; and

a current driver for allowing the drive current which has been set at an arbitrary value to flow during a given period in a current setting mode, while allowing the drive current which has been set with the display data output from the register to flow during the operation periods other than the given period, in accordance with the control signal.

2. The display apparatus of claim 1, wherein the current driver outputs the drive current with a value larger than or equal to a current value set with the display data output from the register, during the given period in the current setting mode.

3. The display apparatus of claim 1, wherein the current driver includes:

a current mode D/A converter including N current sources for outputting currents according to the bits of the display data;

an additional current source for outputting a current with an arbitrary value; and

a first switch for receiving the control signal and electrically connecting the additional current source and the pixel section to each other only during the given period in the current setting mode.

4. The display apparatus of claim 3, wherein the N current sources in the D/A converter are constituted by MISFETs forming current mirrors with each other, and

the additional current source is constituted by one or more MISFETs forming current mirrors together with the MISFETs constituting the N current sources.

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5. The display apparatus of claim 3, wherein the additional current source receives the display data and is capable of outputting a current according to the bits of the display data.

10 6. The display apparatus of claim 1, wherein the current driver is a current mode D/A converter including:

N current sources for outputting currents according to the bits of the display data;

second switches respectively provided on output paths of currents flowing in the respective N current sources;

15 N bypasses for shunting and outputting the currents flowing in the N current sources, by way of the respective second switches; and

third switches respectively provided on the N bypasses,

wherein the third switches are ON with the control signal during the given period in the current setting mode, whereas the third switches are OFF with the control signal during

20 the operation periods other than the given period.

7. The display apparatus of claim 1, wherein the value of the current output from the current driver changes stepwise during the given period in the current setting mode.

25 8. The display apparatus of claim 7, wherein the current driver is a current mode

D/A converter including:

N current sources for outputting currents according to the bits of the display data;
second switches respectively provided on output paths of currents flowing in the
respective N current sources;

5 N bypasses for shunting and outputting the currents flowing in the N current
sources, by way of the respective second switches; and

third switches respectively provided on the N bypasses,

wherein during the given period in the current setting mode, the third switches are
turned ON with the control signal and then turned OFF sequentially from the third switch

10 connected to the current source associated with the most significant bit.

9. The display apparatus of claim 7, wherein the control signal output from the
timing control unit to the third switches in the current setting mode is a plurality of control
signals output at different timings.

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10. The display apparatus of claim 1, wherein the source driver further includes:

voltage setting means for outputting a given voltage; and

a comparator for comparing the output voltage of the voltage setting means with an
output voltage of the current driver and outputting the comparison result to the timing

20 control unit,

wherein while the drive current with the arbitrary value flows from the current
driver during the given period, the value of the drive current is switched to a current value
set with the display data corresponding to a detection that the output voltage of the current
driver becomes equal to the output voltage of the voltage setting means.

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11. The display apparatus of claim 10, wherein the given voltage output from the voltage setting means is a stable output voltage which is the output voltage of the current driver when the value of a current flowing in the pixel section reaches a target value in the current setting mode.

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12. The display apparatus of claim 11, wherein the voltage setting means has a register for latching setting data so as to set the stable output voltage at an arbitrary value.

13. The display apparatus of claim 10, wherein the voltage setting means is a
10 dummy circuit including:

a dummy pixel section which is provided on the display panel, includes a TFT and a capacitance and is not used for a display;

a dummy signal line provided on the display panel and supplying a current to the dummy pixel section; and

15 a dummy pixel driver provided in the source driver, connected to the dummy signal line and the comparator and including a dummy current driver for outputting a constant current during operation.

14. The display apparatus of claim 13, wherein the current driver is plural in
20 number, and

the dummy circuit is singular in number with respect to the plurality of current drivers.

15. The display apparatus of claim 14, wherein the source drivers are respectively
25 provided on a plurality of semiconductor chips having an identical structure, and

the dummy pixel driver is provided on each of the semiconductor chips.

16. The display apparatus of claim 10, wherein the comparator is a comparator having a differential amplifier.

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17. A display apparatus, comprising:

a display panel provided with a pixel section including a light-emitting device driven by a current and with a signal line connected to the pixel section; and

a source driver for supplying a drive current to the pixel section via the signal line,

10 wherein the signal line is divided into a drive-voltage signal line for setting the drive current supplied to the pixel section and a drive-current signal line for transmitting the drive current supplied to the pixel section, and

the source driver includes a voltage driver for supplying a drive voltage to the pixel section via the drive-voltage signal line and current supplying means for allowing the drive
15 current to flow into the pixel section via the drive-current signal line.

18. The display apparatus of claim 17, wherein the current supplying means is a current value detector for detecting the value of a drive current flowing from the pixel section and for feeding back the detection result to the voltage driver, and

20 the source driver further includes a register for latching display data and inputting the display data to the current value detector.

19. The display apparatus of claim 18, wherein the current value detector is connected to the drive-current signal line and includes: a current driver capable of
25 changing the value of a current output from the current driver in accordance with the

display data; and a resistance provided on a connection path between the current driver and the drive-current signal line, and

a voltage generated between the current driver and the resistance is input to the voltage driver as the detection result.

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20. The display apparatus of claim 17, further comprising short-circuit means for making a short circuit between the voltage driver and the current supplying means only during a given period in a current setting mode.

10 21. The display apparatus of claim 17, wherein the pixel section further includes:

a MISFET whose gate electrode is temporarily connected to the drive-voltage signal line, whose drain is temporarily connected to the drive-current signal line and which functions as a current source for supplying a current to the light-emitting device;

15 a pixel input capacitance temporarily connected to the drive-voltage signal line and connected to the gate electrode of the MISFET;

a voltage switch provided on a connection path for connecting the drive-voltage signal line and a connection point between the pixel input capacitance and the gate electrode of the MISFET to each other;

20 a switch interposed between the MISFET and the light-emitting device and temporarily connected to the drive-current signal line; and

a current switch provided between the drive-current signal line and a connection point at which the switch and the MISFET are connected to each other,

wherein the voltage switch and the current switch are turned ON during a current setting mode, while being turned OFF during a display mode, and

25 the switch is turned OFF during the current setting mode, while being turned ON

during the display mode.

22. A display apparatus, comprising:

a display panel provided with a pixel section including a light-emitting device

5 driven by a current and with a signal line connected to the pixel section; and

a source driver for supplying a drive current to the pixel section via the signal line,

wherein the pixel section further includes:

a MISFET whose gate electrode is temporarily connected to a drive-voltage signal line, whose drain is temporarily connected to a drive-current signal line and which

10 functions as a current source for supplying a current to the light-emitting device;

a pixel input capacitance temporarily connected to the drive-voltage signal line and connected to the gate electrode of the MISFET;

a voltage switch provided on a connection path for connecting the drive-voltage signal line and a connection point between the pixel input capacitance and the gate electrode of the MISFET to each other;

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a switch interposed between the MISFET and the light-emitting device and temporarily connected to the drive-current signal line; and

a current switch provided between the drive-current signal line and a connection point at which the switch and the MISFET are connected to each other,

20 wherein the voltage switch and the current switch are turned ON during a current setting mode, while being turned OFF during a display mode, and

the switch is turned OFF during the current setting mode, while being turned ON during the display mode.

23. A display apparatus, comprising:

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a display panel provided with a pixel section including a light-emitting device driven by a current and with a signal line connected to the pixel section; and

a source driver for supplying a drive current to the pixel section via the signal line, wherein the source driver includes:

5 a register for latching display data having N bits and for outputting the display data; a current driver for outputting the drive current according to the display data input from the register;

voltage supplying means having an output impedance lower than that of the current driver;

10 a line for connecting the signal line and the voltage supplying means to each other; a timing control unit for outputting a control signal; and

a short-circuit switch provided on the line and used for electrically connecting the signal line and the voltage supplying means to each other only during a given period in a current setting mode in accordance with the control signal.

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24. The display apparatus of claim 23, wherein the voltage supplying means includes:

a dummy circuit including: a dummy pixel section which is provided on the display panel, includes a TFT and a capacitance and is not used for a display; a dummy signal line
20 provided on the display panel and used for supplying a current to the dummy pixel section; and a dummy pixel driver provided in the source driver, connected to the dummy signal line and including a dummy current driver for outputting a constant current during operation; and

a current amplifying buffer connected to the dummy current driver and used for
25 outputting an output voltage of the dummy current driver to the signal line.

25. The display apparatus of claim 23, wherein the current driver is plural in number, and

the voltage supplying means is singular in number with respect to the plurality of current drivers.

26. The display apparatus of claim 23, wherein the voltage supplying means is a voltage-output D/A converter provided in a one-to-one correspondence with the current driver and capable of changing an output voltage of the D/A converter in accordance with the display data output from the register.

27. The display apparatus of claim 26, wherein the voltage-output D/A converter changes the output voltage of the D/A converter in accordance with the one or two most significant bits of the display data.

28. The display apparatus of claim 23, wherein the voltage supplying means is a line connected to an external power supply.

29. A display apparatus, comprising:
a display panel provided with a pixel section including a light-emitting device driven by a current and with a signal line connected to the pixel section; and
a source driver for supplying a drive current to the pixel section via the signal line, wherein the source driver includes:
a register for latching display data having N bits and for outputting the display data;
bit-data adding means for adding M bits to the display data input from the register

and for outputting a display data having (N+M) bits during a given period in a current setting mode;

a timing control unit for outputting a control signal; and

a current driver for allowing the drive current which is set with the display data
5 having (N+M) bits to flow during the given period in the current setting mode, while
allowing the drive current which is set with the display data having N bits during the
operation periods other than the given period, in accordance with the control signal.

30. The display apparatus of claim 29, wherein the M bits are one or two bits.

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31. A display apparatus, comprising:

a display panel provided with a pixel section including a light-emitting device
driven by a current and with a signal line connected to the pixel section; and

a source driver including a register for latching display data having N bits and for
15 outputting the display data, a current driver for outputting a drive current according to the
bits of the display data to the signal line and a reference current generator for supplying a
reference current to the current driver,

wherein the current driver includes N current sources constituted by MISFETs
forming current mirrors with each other,

20 the reference current generator includes: a first MISFET whose source receives a
power-supply voltage and which allows the reference current to flow; and a variable
resistance which is connected to a drain of the first MISFET and whose resistance value
changes depending on the display data when the display data is input thereto; a second
MISFET forming a current mirror together with the first MISFET; and a third MISFET
25 connected to the second MISFET and used for supplying the reference current to each of

the N current sources via a current mirror, and

the display data output from the register is input to the variable resistance during a given period in a current setting mode.

5 32. A source driver, comprising:

a register for latching display data having N bits and for outputting the display data;

a timing control unit for outputting a control signal; and

a current driver for allowing the drive current which has a value larger than or equal to a current value set with the display data to flow during a given period in a current
10 setting mode, while allowing the drive current which is set with the display data output from the register during the operation periods other than the given period, in accordance with the control signal.

33. The source driver of claim 32, further comprising:

15 voltage setting means for outputting a given voltage; and

a comparator for comparing the output voltage of the voltage setting means with an output voltage of the current driver and for outputting the comparison result to the timing control unit,

wherein while the drive current with the value larger than or equal to the current
20 value set with the display data flows from the current driver during the given period, the value of the drive current is switched to the current value set with the display data corresponding to a detection that the output voltage of the current driver becomes equal to the output voltage of the voltage setting means.

25 34. A source driver, comprising:

a voltage driver for supplying a voltage;
a register for latching and outputting display data;
current supplying means for receiving the display data output from the register and
for allowing a current according to the display data to flow.

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35. The source driver of claim 34, wherein the current supplying means is a current
value detector for detecting the value of an output current from the source driver and for
feeding back the detection result to the voltage driver.

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36. The source driver of claim 34, further comprising short-circuit means for
making a short circuit between the voltage driver and the current supplying means only
during a given period in a current setting mode.

37. A source driver, comprising:

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a register for latching display data having N bits and for outputting the display data;
a current driver having an output terminal for outputting the drive current according
to the display data input from the register;

voltage supplying means having an output impedance lower than that of the current
driver;

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a line for connecting the output terminal of the current driver and the voltage
supplying means;

a timing control unit for outputting a control signal; and

a short-circuit switch provided on the line and used for electrically connecting the
line and the voltage supplying means to each other only during a given period in a current
setting mode in accordance with the control signal.

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38. A source driver comprising:

a register for latching display data having N bits and for outputting the display data;

bit-data adding means for adding M bits to the display data input from the register

5 and for outputting a display data having (N+M) bits during a given period in a current setting mode;

a timing control unit for outputting a control signal; and

a current driver for allowing a current which is set with the display data having (N+M) bits to flow during the given period in the current setting mode, while allowing a
10 current which is set with the display data having N bits during the operation periods other than the given period, in accordance with the control signal.

39. A source driver comprising:

a register for latching display data having N bits and for outputting the display data;

15 a current driver for outputting a drive current according to the bits of the display data to a signal line; and

a reference current generator for supplying a reference current to the current driver,

wherein the current driver includes N current sources constituted by MISFETs forming current mirrors with each other,

20 the reference current generator includes: a first MISFET whose source receives a power-supply voltage and which allows the reference current to flow; and a variable resistance which is connected to a drain of the first MISFET and whose resistance value changes depending on the display data when the display data is input thereto; a second MISFET forming a current mirror together with the first MISFET; and a third MISFET
25 connected to the second MISFET and used for supplying the reference current to each of

the N current sources via a current mirror, and

the display data output from the register is input to the variable resistance during a given period in a current setting mode.

5 40. A display panel comprising:

a pixel section including a light-emitting device driven by a current;

a signal line connected to the pixel section;

a dummy pixel section which is not used for a display; and

a dummy signal line connected to the dummy pixel section.

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41. A display panel comprising:

a pixel section including a light-emitting device driven by a current, the pixel section being driven by a voltage and a current;

drive-voltage signal line for supplying a drive voltage to the pixel section; and

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drive-current signal line for outputting a drive current in the pixel section.

42. The display panel of claim 41, further comprising:

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a MISFET whose gate electrode is temporarily connected to the drive-voltage signal line, whose drain is temporarily connected to the drive-current signal line and which functions as a current source for supplying a current to the light-emitting device;

a pixel input capacitance temporarily connected to the drive-voltage signal line and connected to the gate electrode of the MISFET;

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a voltage switch provided on a connection path for connecting the drive-voltage signal line and a connection point between the pixel input capacitance and the gate electrode of the MISFET to each other;

a switch interposed between the MISFET and the light-emitting device and temporarily connected to the drive-current signal line; and

a current switch provided between the drive-current signal line and a connection point at which the switch and the MISFET are connected to each other,

5 wherein the switch is turned OFF in a current setting mode, while being turned ON in a display mode.